APPENDIX VII

(*See* foot-note to para. 22 of Appendix V)

Arrangements for the disinfection of drinking water

A.—SUPPLY OF PERMANGANATE OF POTASH

The Charge Officer of a famine relief camp shall carry out the disinfection of wells in the camp or in any of the kitchens attached. Wells used by the occupants of poor-houses shall be disinfected, when necessary, by the superintendent in charge. The disinfection of village wells in the neighbourhood of relief camps or works shall be undertaken by the Circle Inspectors. Disinfecting operations should be carried out in the manner laid down in para. 22 of Appendix V and, wherever possible, under the supervision of Public Works Department officers.

2. In anticipation of cholera outbreaks the Executive Engineer will, on famine being declared, arrange for the purchase of a total quantity for the district calculated at about two cwts. of the salt per famine affected taluka, which he will distribute for disinfection purposes, wherever required.

3. The permanganate should be kept in 2-oz. packets packed forty in a box ready for immediate use.

4. A supply of not less than one cwt. of the salt shall be kept at each sub-divisional head-quarter station in charge of the Public Works Department.

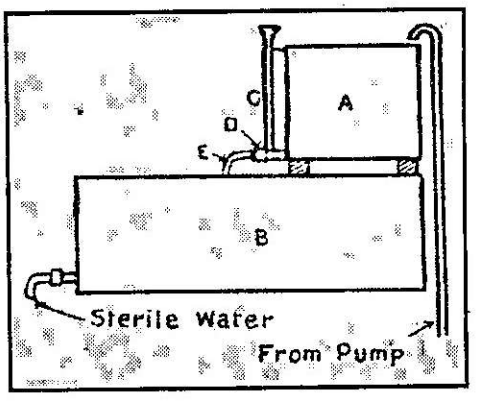
5. Mamlatdars will inspect their stocks on 1st March and take steps to keep them replenished to a minimum supply of one cwt.

B.—APPARATUS FOR THE STERILIZATION OF WATER REQUIRED FOR FAMINE CAMPS WITH HYPOCHLORITE OF LIME.

[*Vide* para. 23 (*a*) (iv) of Appendix V.]

A simple apparatus is required for mixing a solution of hypochlorite of lime, or other disinfectant, with impure drinking water, in the correct proportions for rendering the water free from dangerous bacteria; the process must be sufficiently simple for use by unskilled men, and the results must be thoroughly reliable. An apparatus was tried at the camp of the Poona Volunteer Rifles at Chinchwad which fulfilled these conditions.

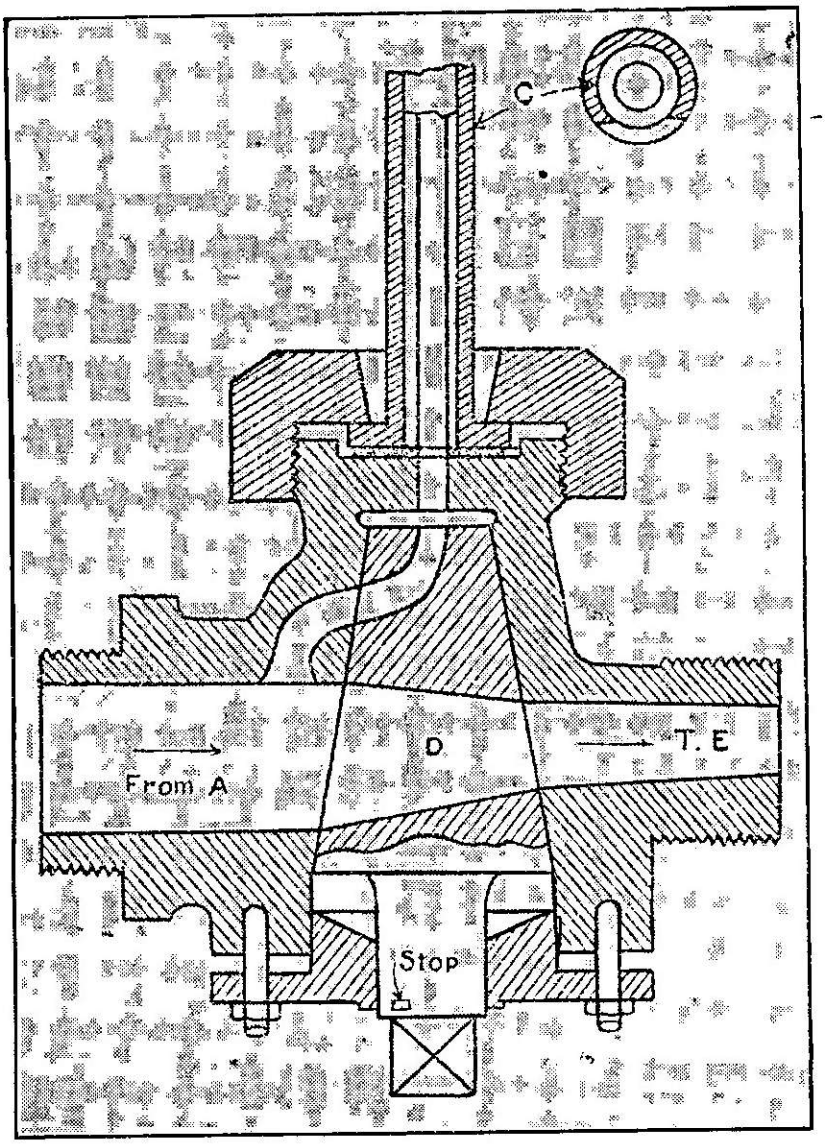
FIG. 1



Water is pumped from the source of supply to a receiving tank A; the hypochlorite solution is mixed with the water to be treated as it leaves this track, and the mixture then falls into a large tank B, in which the process is completed in the course of a few minutes.

The water entering the tank B smells strongly of chlorine, but that leaving it is odourless and free from dangerous bacteria.

FIG. 2



The actual apparatus by which the mixing is carried out consists of a glass gauge, protected by a brass tube partly cut away (C fig. 2), which stands beside the tank A, and is connected to a three-way cock D. When the cock D is turned on, the hypochlorite solution in C and the water to be treated from the tank A simultaneously run out of the pipe E into the tank B, and in so doing are thoroughly mixed. The pipe E should preferably be several feet in length, so that the eddies of the liquid flowing through it will have time to cause thorough mixing.

A section of cock D suitable for this purpose is shown in figure 3, and an alternative form in fig. 4. The essential point in the design is that the passage by which the water enters the cock must be considerably larger than that by which it issues from it. The entrance passage should be quite twice the diameter of the outlet, and the large diameter *should be continued till the hypochlorite solution has entered the* stream passing through the cock. If this is not attended to, the mixture will not be of correct proportions, as the static head in the tank A and in the gauge C will not be the same unless the flow through the cock, at the point where the hypochlorite solution enters, is comparatively slow. The cock should preferably be made so that all three passages are closed when the cock is turned off.

FIG. 3

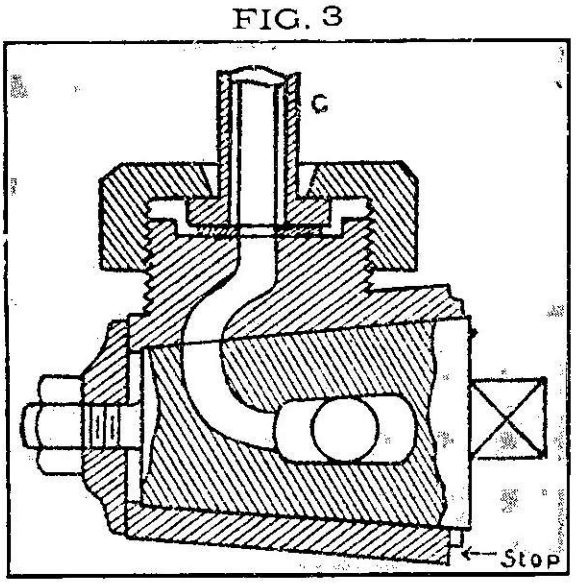
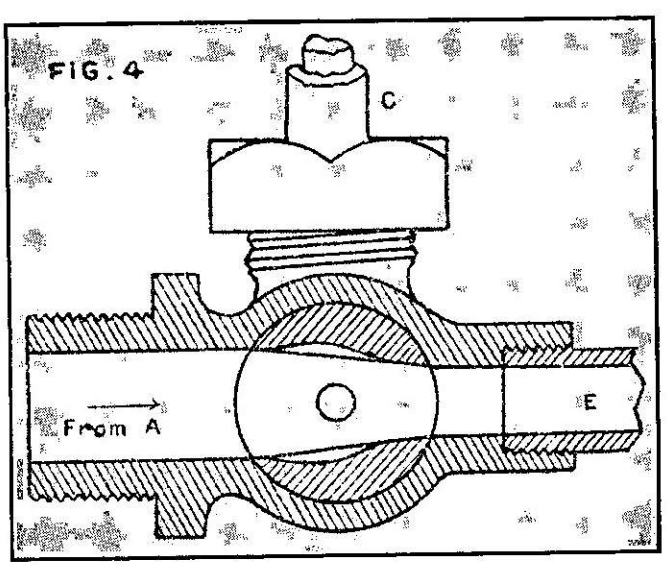


FIG. 4



In using the apparatus, the hypochlorite solution is mixed in a separate bottle by agitating bleaching powder and water in the correct proportions. Free lime is allowed to settle; the tank A is then filled with the untreated water, and the hypochlorite solution is poured into the gauge C to the same level as that of the water in the tank, the cock D remaining closed meanwhile. The cock is then opened, and the untreated water and hypochlorite solution flow through it into the tank B, mixing *en route*. As the water levels in the tank A and in the gauge glass C fall at the same rate, the resulting mixture is in the correct proportions throughout.

To ensure that the proportion of disinfectant added shall be correct, two methods may be used. The strength of the hypochlorite solution may be calculated by the following formulæ:—

Let D = the diameter of the tank A in inches, if it is circular in plan,
B = the breadth, and
L = the length of the tank, if it is rectangular, in inches,
D = the diameter of the inside of the gauge glass C, in inches,
and R = the number of lbs. of bleaching powder required per million gallons of the water to be treated, which may be taken as 20 lbs. as a first approximation for bad water; the quantity may be adjusted after test of the treated water.

Then, if X = the percentage strength of the hypochlorite solution which is to be used expressed as the ratio $\frac{\text{weight of bleaching powder} \times 100.}{\text{weight of water.}}$

$$x = \frac{D2 \times R}{100{,}000 \times D2} \text{ for a circular tank,}$$

and $$x = \frac{1{\cdot}3\,B \times L \times R}{100{,}000 \times D2} \text{ for a rectangular tank.}$$

The whole of this formula, omitting "R", may be worked out once for all for a given tank and gauge glass, and then multiplied by whatever value of R it is desired to use for the time being.

An alternative method of ascertaining the strength of solution required is to take an amount of bleaching powder equal to $R \times \frac{\text{capacity of the tank A in gallons}}{1{,}000{,}000}$ and add this to an amount of water just sufficient to fill the gauge glass C, which may be found by trial.

The tank A must of course have vertical sides, *i.e.*, it must have a uniform section throughout its height.

APPENDIX VIII

(*See* section 227)

Lists of Reports and Returns to be submitted by the several officers under the Code

A.—Local Government to Government of India

(*a*) *When scarcity or famine is impending*

Special preliminary reports regarding the probable extent of distress and the state of affairs [secs. 19 (*p*), 29 and App. II, 1, 2].

(*b*) *During scarcity and famine*

1. Inclusion of a railway in the programme of relief works (App. I)

2. Monthly and quarterly narrative progress reports regarding railway works (App. I).

3. The first indication of scarcity and measures taken to ascertain the distress to be given in the weekly telegraphic report (App. II, 3).

4. Special telegram regarding famine measures (App. II, 4, 5).

5. Report regarding the inclusion in or exclusion from the affected area of a district or State in the famine season telegram (App. II, 6).

6. Monthly report in Forms (sec. 227 and App. II, 8).